

簡單其實不簡單

張大健

CCCA 2016-3-26

Copyrighted Material

WHY DIDN'T
I THINK
 of
THAT?

101 INVENTIONS THAT CHANGED
THE WORLD BY HARDLY TRYING

ANTHONY RUBINO, JR.

Copyrighted Material

為什麼我沒有想到呢？

再別康橋

徐志摩 1928

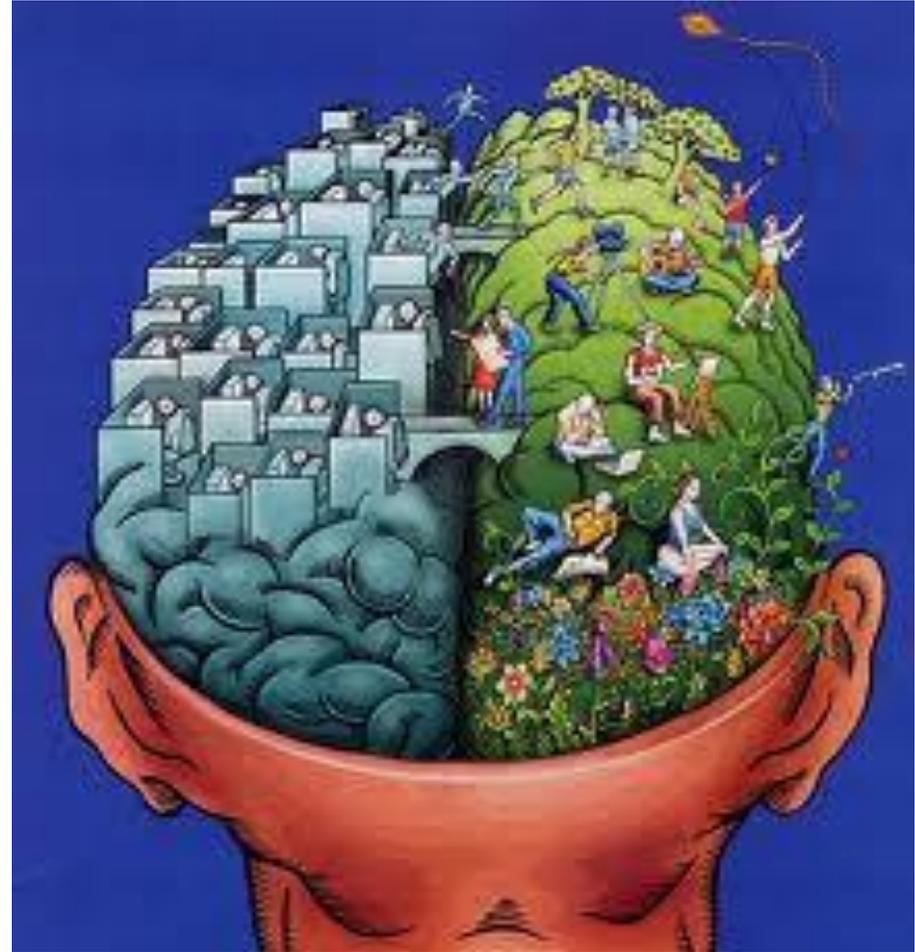
輕輕的我走了，
正如我輕輕的來；
我揮一揮衣袖，
不帶走一片雲彩。

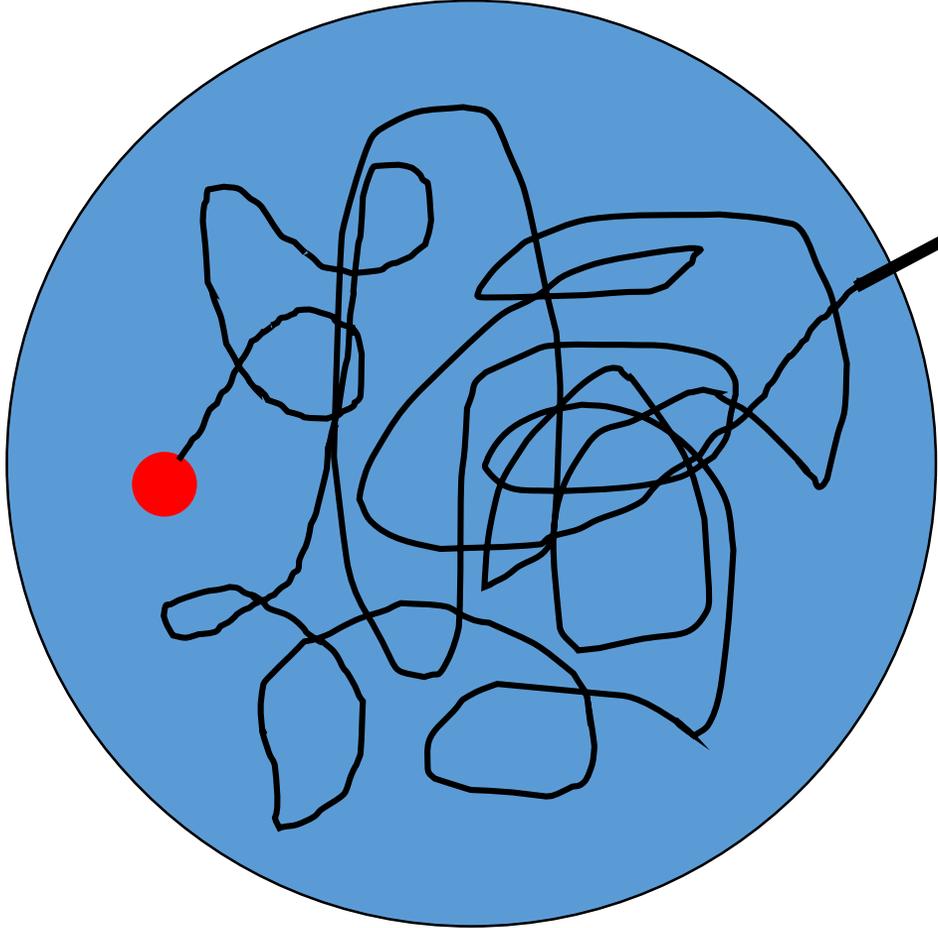


再見創意

張大健 2012

悄悄的她走了，
正如她悄悄的來；
就像一陳微風，
吹不皺半絲腦海。





技巧

模糊思維 (Think Sfumato)

簡單化

大局觀 (Go Holistic)

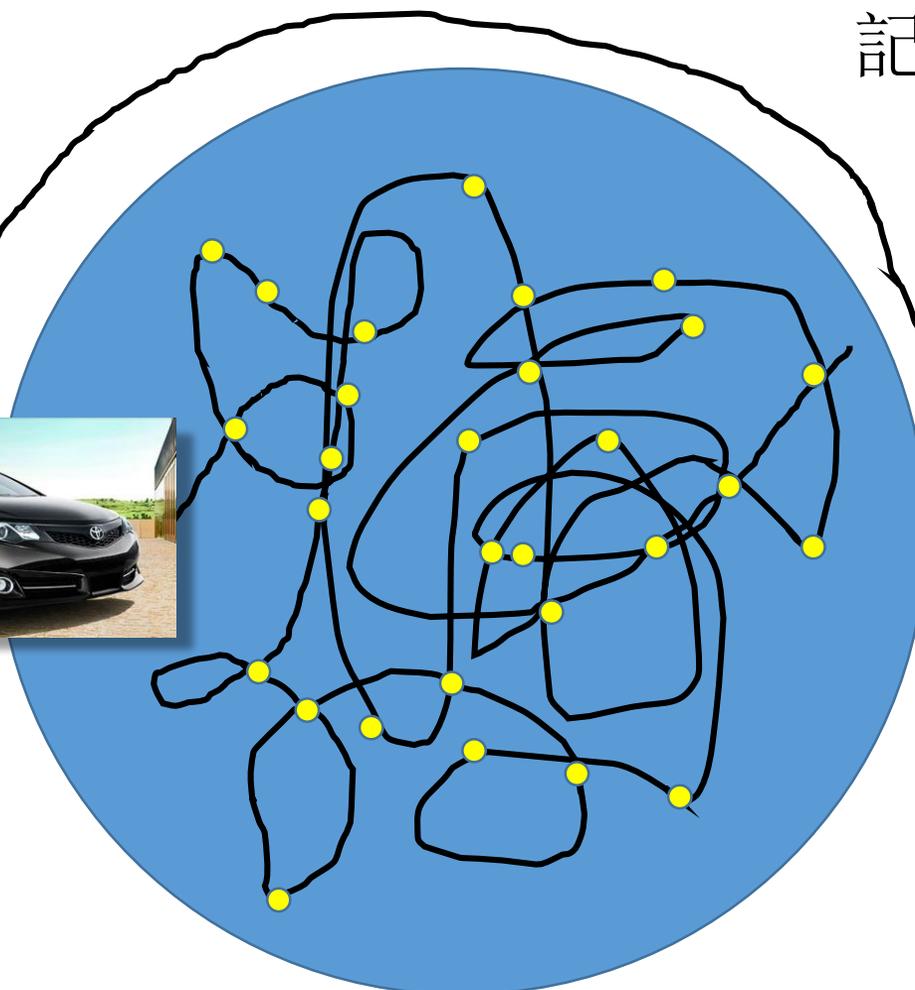
記憶力

聯想力

抓關鍵

視覺感

猜測



習慣

Curiosity 好奇心

觀察, 求知慾

態度

Passion 熱忱

Perseverance 執著

SIMPLE CAN BE HARDER THAN COMPLEX:

***You have to work hard to get your
thinking clean to make it simple.***

***But it's worth it in the end, because
once you get there, you can move
mountains.***

---Steve Jobs---

鯨



水來土掩

用”加“來解決問題
最後導致失敗

大禹治水



疏通河道
用”減“來解決問題
最後獲得成功

爱上一个不回家的人……



唉！



科學中簡單的美

$$E = mc^2$$

$$F = ma$$

$\Sigma F_y = 0 \Rightarrow F_n - mg \cos \theta = 0$
 $E_{pot, A} = 0$
 $F_z = F = m_2 g + 2F_3$
 $\frac{dv}{dt} = \frac{dv}{du} \frac{du}{dt}$
 $-m_1 g + m_2 g$
 $v = \frac{2(m_2 - m_1)gh}{(m_1 + m_2)}$
 $\psi = 0, d = n \frac{2\pi}{\lambda}; n = 1, 2, 3$
 $E = \frac{1}{2} m v^2 = \frac{p^2}{2m}; E_n = \frac{p_n^2}{2m}$
 $E_1 = \frac{h^2}{8md^2}$
 $E_2 = 4E_1$
 $E_3 = 9E_1$
 $E_n = n^2 \frac{h^2}{8md^2} = n^2 E_1$
 $|\psi|^2 = A^2 \exp(-\frac{x^2}{2\sigma^2})$
 $\beta(h) = \frac{\sigma}{\sqrt{\pi}} e^{-\sigma^2(x-h)^2}$
 $Re(\psi) = A \cos(k_0 x - \omega t)$
 $|\psi|^2 = \frac{1}{4\pi\epsilon_0} \frac{ze^2}{r}$
 $E_{pot} = -\frac{1}{4\pi\epsilon_0} \frac{ze^2}{r}$
 $E_{kin} = \frac{1}{2} m v^2 = \frac{1}{2} \frac{1}{4\pi\epsilon_0} \frac{ze^2}{r}$
 $E_{pot} = -2E_{kin}$
 $U_H = -J_B \cdot (\frac{V}{\mu}) de$
 $U_H = E_H b = v d B b$
 $J = \frac{1}{V} q v d A$
 $b \frac{u}{V} = \frac{1}{4\pi v b} - \frac{1}{b d e v d}$
 $= -J_B \cdot de U_H$
 $\frac{A'B'}{AB} = \frac{s'}{s}$
 $\frac{1}{f} = \frac{1}{s} + \frac{1}{s'}$
 $\frac{A'B'}{AB} = \frac{s'-f}{f}$
 $\frac{s'}{s} = \frac{s'-f}{f}$
 $\frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 = \frac{1}{2} m_1 v_1'^2 + \frac{1}{2} m_2 v_2'^2$
 $m \cdot a$
 $\tan \theta = \frac{\alpha x}{g}; \alpha = g \tan \theta$
 $F_s = \frac{mg}{\cos \theta}; |F_s| = \frac{mg}{\sin \theta}$
 $E_{pot}(r) = -\frac{1}{2} \frac{m v_{max}^2}{r}$
 $E_{kin} = E - E_{pot}$
 $v = \frac{\lambda}{T} = v \lambda$
 $\omega = k \lambda$
 $\Sigma F_y = m a_y = F_{ay} + F_y = F \sin \phi + F_y$
 $F = -k \Delta y$
 $F_G = mg$
 $U_2 A_2 = v_1 A_1$
 $P_1 + \frac{1}{2} \rho v_1^2 = P_2 + \frac{1}{2} \rho v_2^2$
 $\frac{1}{2} \rho F (v_2^2 - v_1^2) = (\rho v_1 - \rho v_2) g h$
 $\Sigma F_y = -k_F (y' + y_0) + m a$
 $\Sigma F_y = -k_F y'$
 $-k_F y' = m \frac{d^2 y}{dt^2}$
 $E_{pot} = -\int k_F y' dy$
 $\downarrow m a = \frac{1}{2} k_F y'^2 + E_{pot}, 0$
 $U_{A, eff} = X_C J_H$
 $U_{A, eff} = X_C J_H = \frac{X_C U_{eff}}{Z}$
 $U_{A, eff} = X_C J_H = \frac{X_C U_{eff}}{\sqrt{R^2 + X_C^2}}$
 $F_n, x + F_a, x = m a$
 $F_n, x = 0; F_a, x = |F_a| \sin \theta = mg \sin \theta$
 $a_x = g \sin \theta$
 $v^2 = 2 g \sin \theta \Delta x$
 $v^2 = 2 g h$
 $v_s = \sqrt{2 g h} \cdot \sin \theta$
 $\oint E dl = -\frac{d}{dt} \int B_n dA = -\int \frac{dB_n}{dt} dA$
 $\nabla \cdot B = 0$
 $\oint B dl = \mu_0 I + \mu_0 \epsilon_0 \frac{d}{dt} \int E_n dA$
 $F_{s, 2} \dots F_{s, 1} \dots m a$
 $|F_{s, 1}| = -\frac{1}{2} F_G$
 $F_{s, 2} = |F_{s, 1}| \cdot \frac{\cos \alpha}{\cos \theta}$
 $\frac{v}{c} = \sqrt{2 g r_e}$
 $\dots E_2 > 9$

一位名人對簡單化的看法

*It is not a daily increase
but a daily decrease,
hack away the inessentials.*



Violin I

Violin II

Viola

Cello

Bassoon

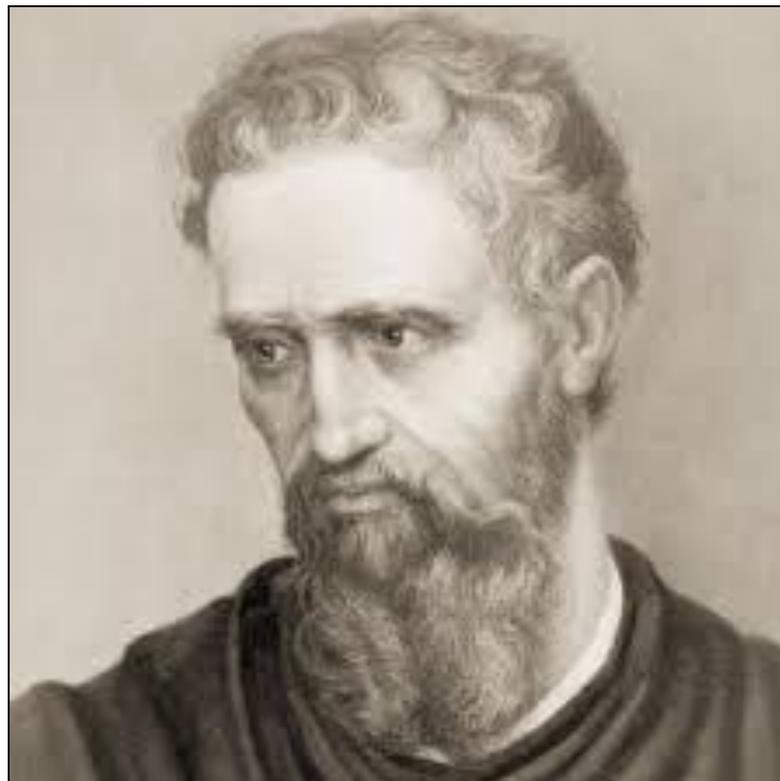
A musical score for five instruments: Violin I, Violin II, Viola, Cello, and Bassoon. The score is written in a single system with five staves. The key signature is one flat (B-flat) and the time signature is 4/4. The music is marked with a forte dynamic (*ff*). The Violin I and Violin II parts play a melodic line with eighth and sixteenth notes. The Viola, Cello, and Bassoon parts play a rhythmic accompaniment with eighth and sixteenth notes. The score is divided into two measures by a vertical bar line.

音樂中簡單的美



米高安琪羅的鉅作

The Statue of David



當我第一次看到這塊大石，我可以看到大衛站在裡面。我只要用我的鑿子和錘把不需要的部分一片片地敲掉，大衛就職啊我眼前出現了。

（用的是“減”的思維）

用同樣的思維摺紙兔



紅磡碼頭測海浪



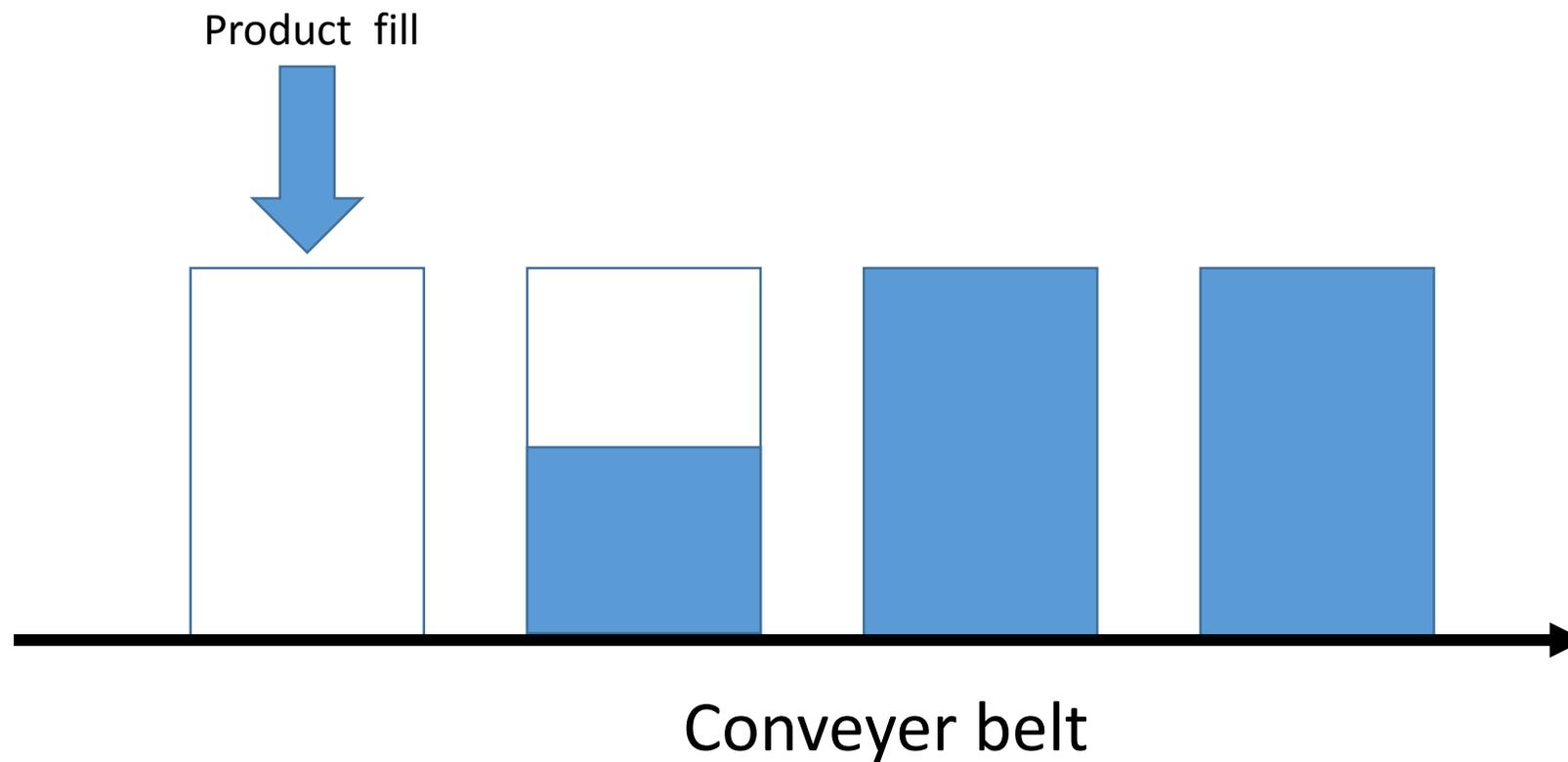
怎麼樣可以防止iPhone 過熱？

“加”和“減”的解決方案。

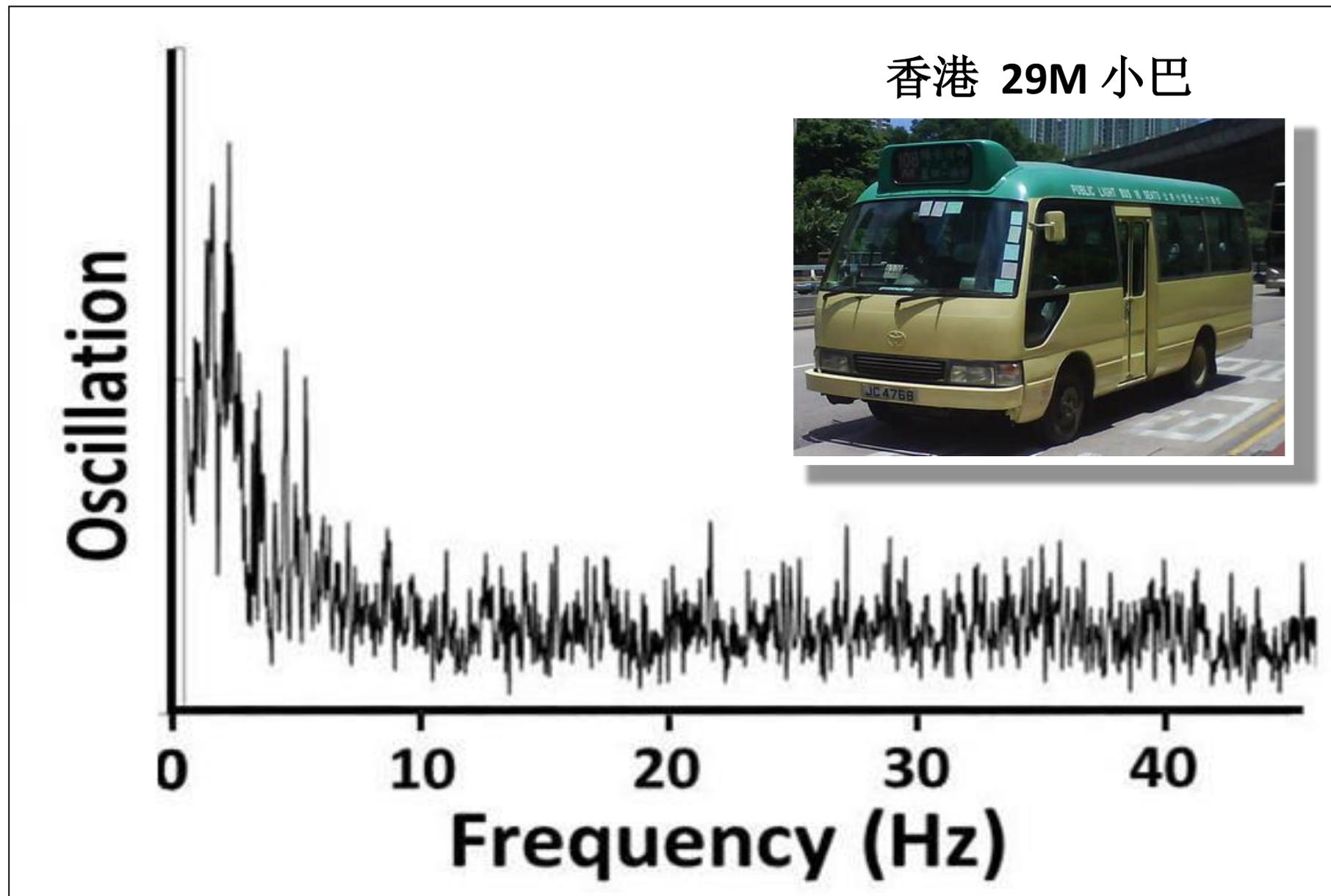
熒光棍



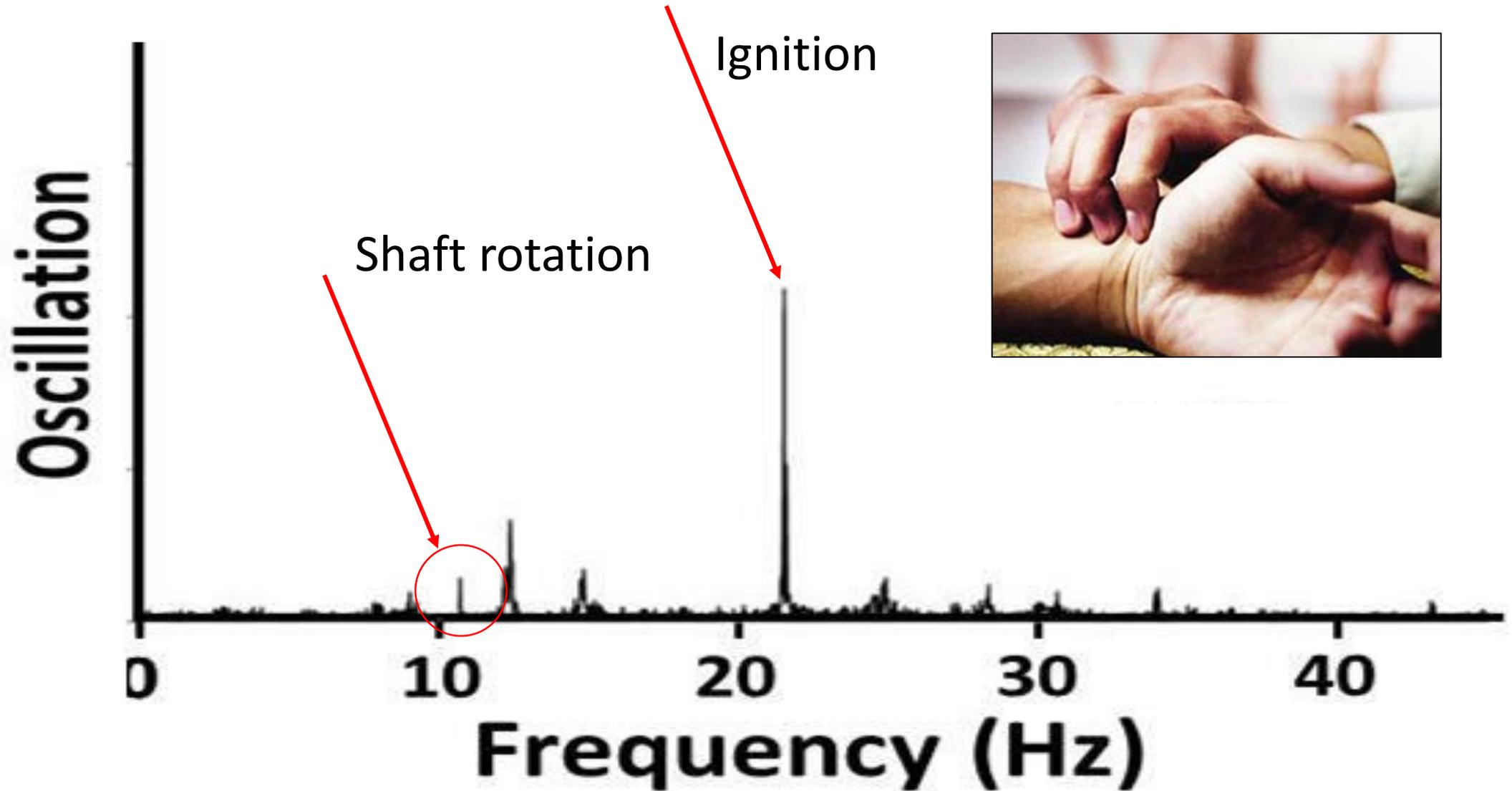
台糖生產線上的智慧



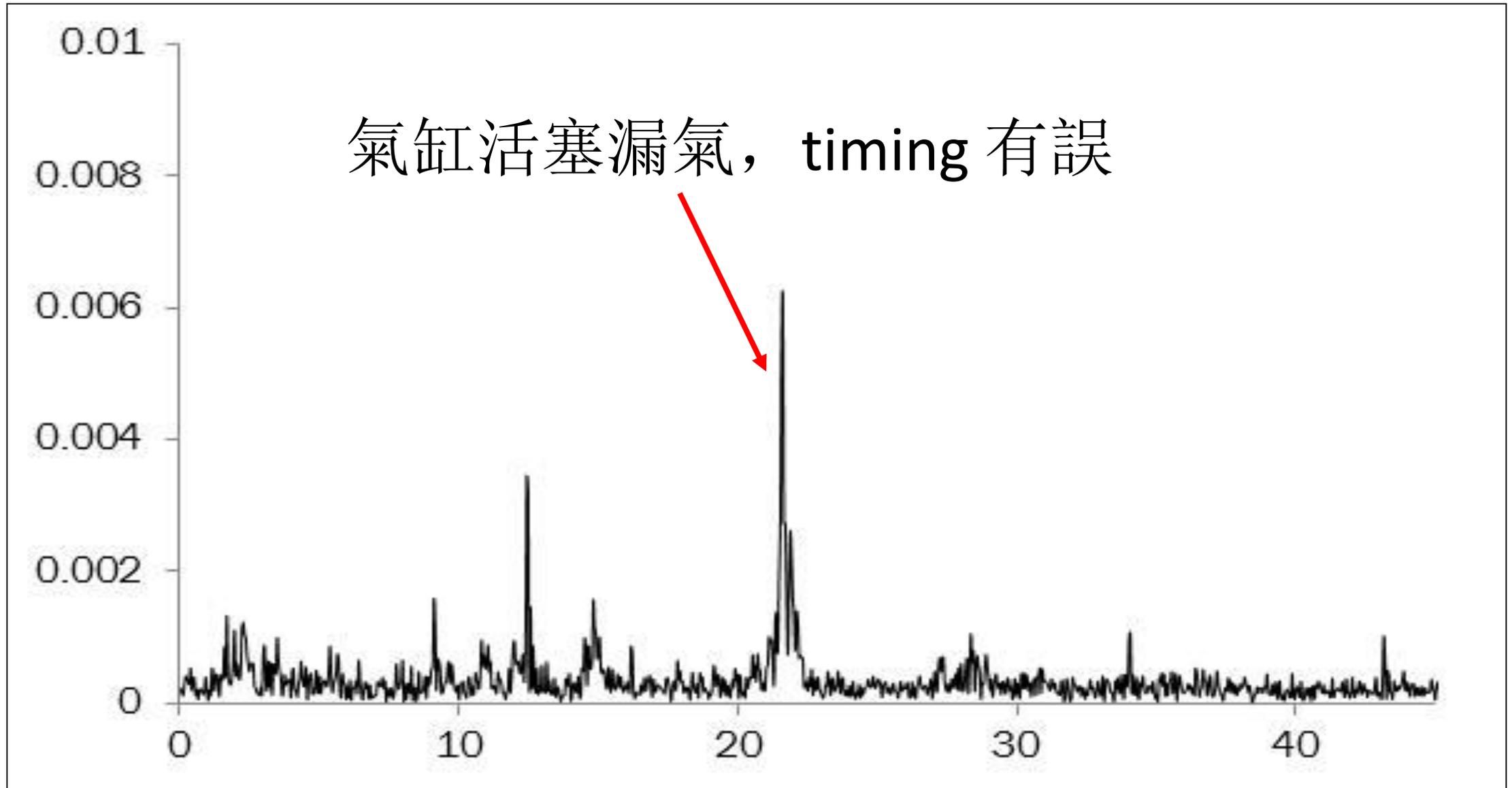
香港小巴的振動



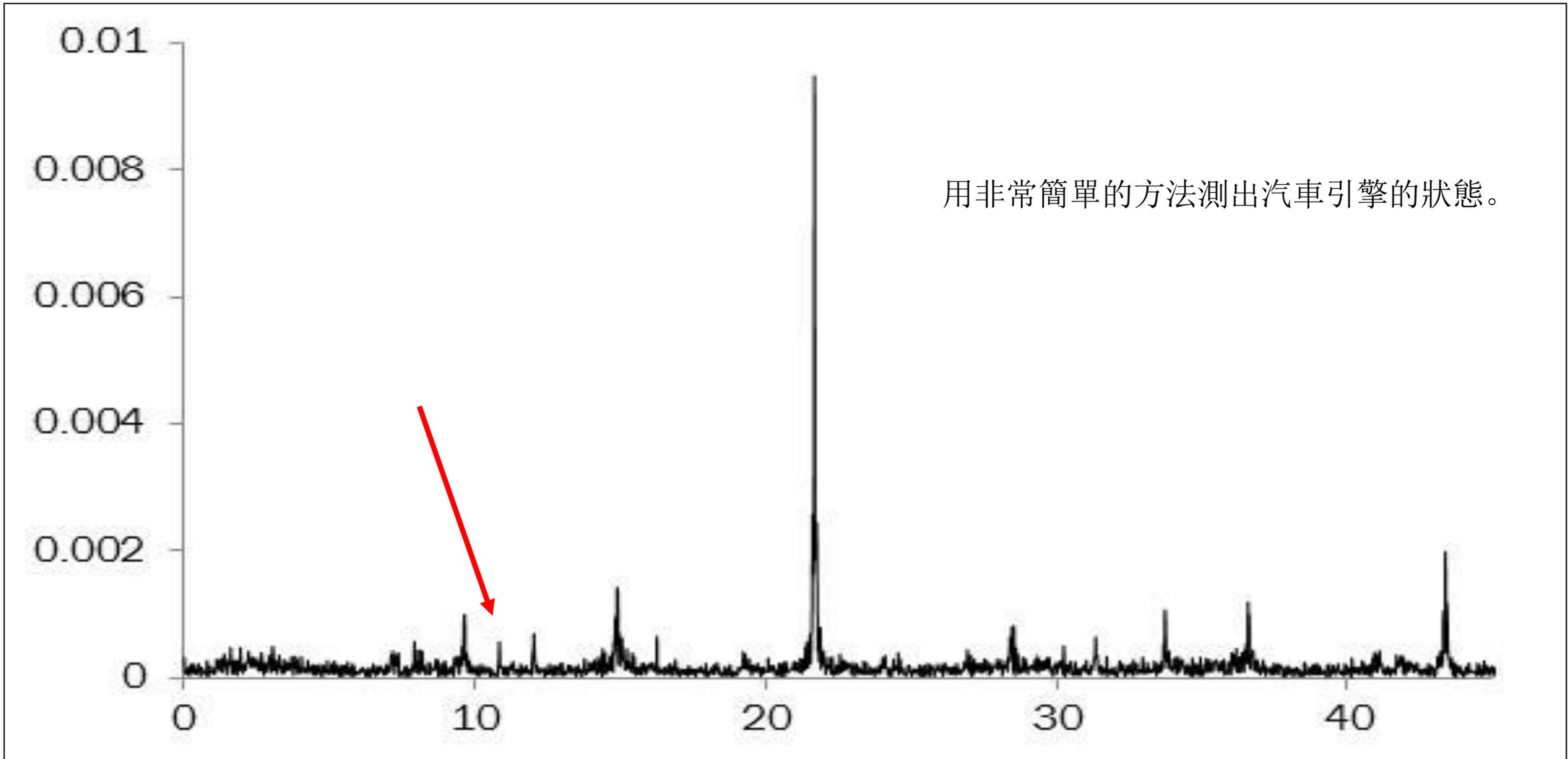
替小把脈



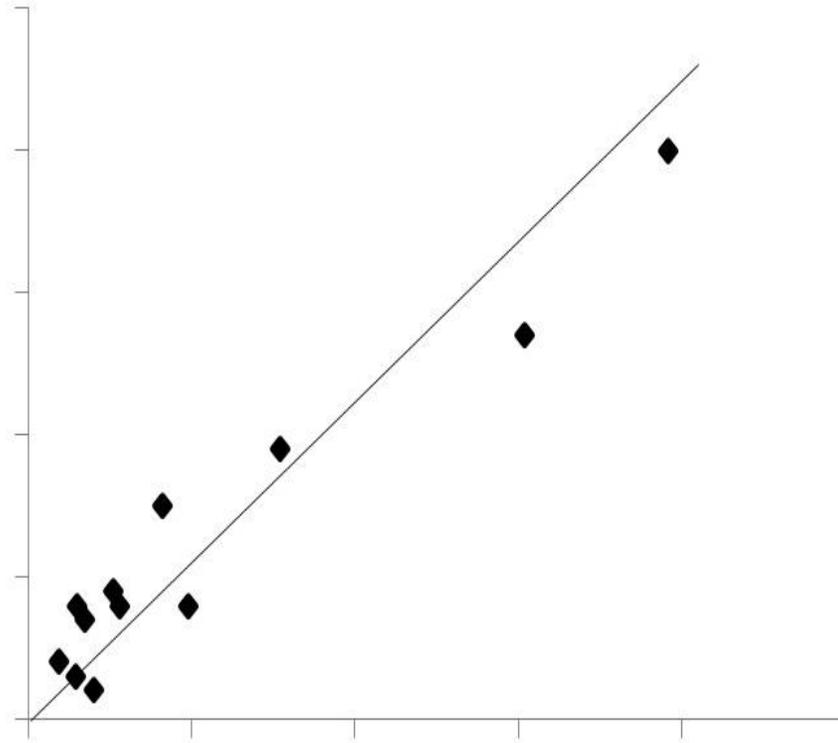
維修以前



維修以後



人體平衡指數測量

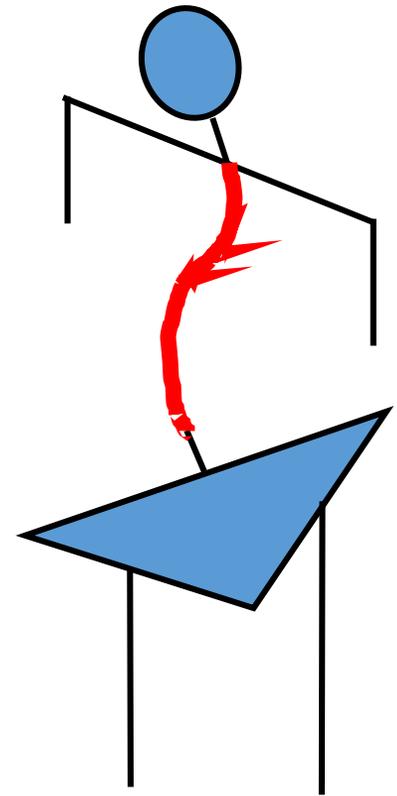
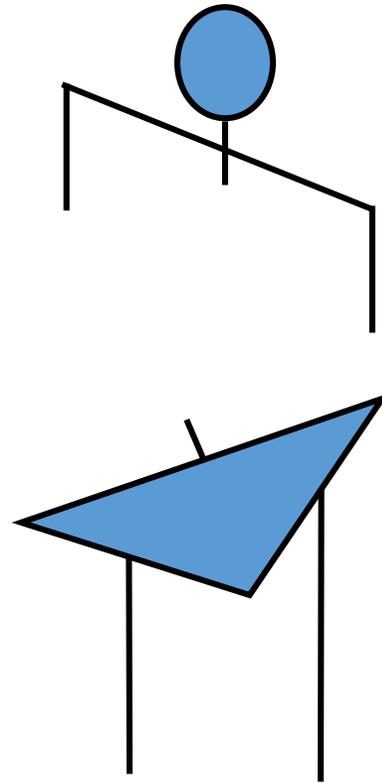
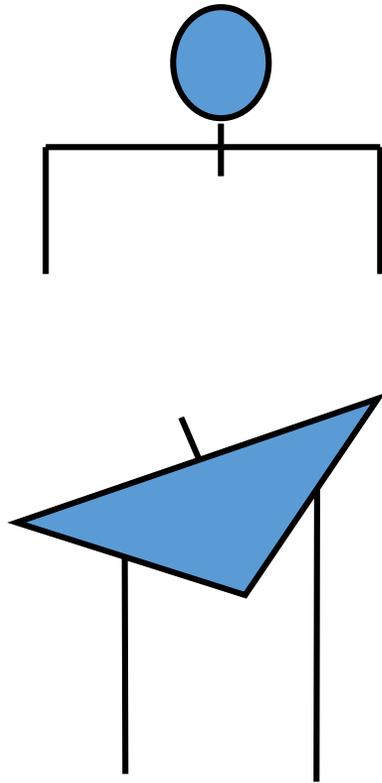
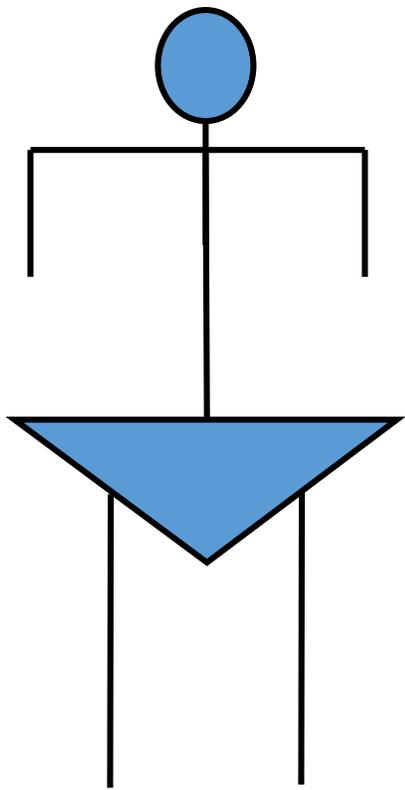


Gait Force Image



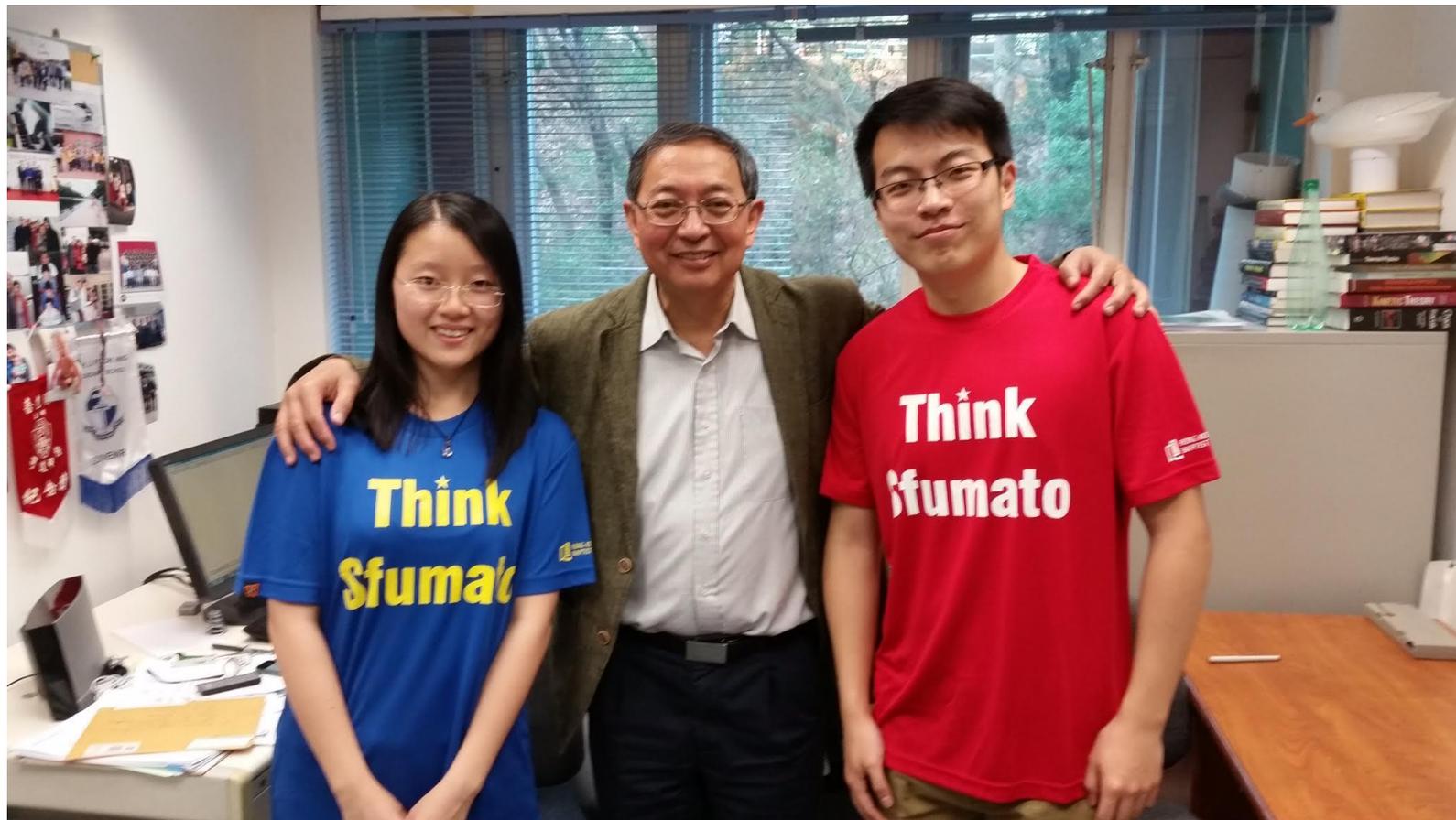
包含了各種有關步態的訊息

長短腳 (Leg Length Discrepancy - LLD)



Go Holistic: 視野要廣

Thick Sfumatao: 思維要從模糊演變到清晰。（摒除主見，包容多角度的想法，慢慢消化）



我和學生們



我的老師和師母